DIELECTRIC FILMS FOR NARROW GAP-FILL APPLICATIONS

ABSTRACT OF THE DISCLOSURE

A colloidal suspension of nanoparticles composed of a dense material dispersed in a solvent is used in forming a gap-filling dielectric material with low thermal shrinkage. The dielectric material is particularly useful for pre-metal dielectric and shallow trench isolation applications. According to the methods of forming a dielectric material, the colloidal suspension is deposited on a substrate and dried to form a porous intermediate layer. The intermediate layer is modified by infiltration with a liquid phase matrix material, such as a spin-on polymer, followed by curing, by infiltration with a gas phase matrix material, followed by curing, or by curing alone, to provide a gap-filling, thermally stable, etch resistant dielectric material.

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